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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,900	07/21/2003	Jerry R. Kukulka	PD 02-1013 (21797-0004)	7639

7590 10/06/2006

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EXAMINER
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FICK, ANTHONY D

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 10/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/623,900	<b>Applicant(s)</b> KUKULKA ET AL.	
	<b>Examiner</b> Anthony Fick	<b>Art Unit</b> 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 21 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>7/21/03</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

1. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claim 17 has been renumbered 16.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2 and 5 through 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. (U.S. 4,468,853) in view of Studer et al. (Fabrication of microfluidic devices for AC electrokinetic fluid pumping, Microelectronic Engineering, 61-62, 2002, pgs 915-920).

Morita discloses a method of manufacturing a solar cell as shown in figure 5. The solar cell comprises an active semiconductor structure, a back electrical contact and a front electrical contact.

Regarding claim 1, Morita discloses a front electrical contact of multiple layers including titanium, a barrier layer of palladium, and a joining layer of silver (figure 4 and

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column 4, first paragraph). Morita also discloses a barrier layer of platinum (column 5, first paragraph).

Regarding claim 2, figure 5 shows a front electrical lead affixed to an attachment pad region.

Regarding claims 6 and 7, the layers of Morita are palladium or platinum and silver as stated above.

Regarding claim 9, Morita discloses the semiconductor is a doped silicon layer (column 3, paragraph 5).

Regarding claim 10, Morita discloses a method of making the solar cell including providing an active semiconductor structure, providing a back electrical contact and applying a front electrical contact with multiple layers.

Regarding claims 11 and 12, Morita discloses sequential vacuum deposition of the layers (column 4, paragraph 1).

Regarding claim 13, Morita discloses attachment of a front electrical lead (figure 5).

Regarding claims 15 and 16, as stated above, Morita utilizes palladium or platinum as the barrier layer and a doped silicon layer as the semiconductor.

Regarding claim 17, Morita discloses sequential vacuum deposition of the layers (column 4, paragraph 1), the use of platinum and silver as layers (column 5, paragraph 1) and affixing a front electrical lead (figure 5).

The difference between Morita and the claims is the requirement of a diffusion layer between the titanium and barrier layer, specifically a gold diffusion layer.

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Studer et al. teaches fabrication of electrodes on a silicon based (glass) surface. The electrodes have a layer of titanium followed by a layer of gold (Experimental section paragraph 2).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the gold layer on top of the titanium layer as in Studer et al. within the device and method of Morita because the gold layer on top of the titanium layer provides improved adhesion to the surface (Studer et al. Experimental section paragraph 2). Because Studer et al. and Morita are both concerned with attaching microelectrodes to a silicon based surface, one would have a reasonable expectation of success from the combination. Thus the combination meets claims 1, 2, 5 through 7, 9 through 13, 15, 16 and 17.

The difference between Morita and claims 8 and 14 is the requirement of specific layer thicknesses. Morita discloses layer thicknesses for titanium, palladium and silver within the angstrom and micron ranges. Studer et al. teaches a 100 angstrom titanium layer and a 300 angstrom gold layer.

It would have been further obvious to one having ordinary skill in the art at the time the invention was made to choose specific thicknesses for the layers as within claims 8 and 14. It is known in the art as shown by Studer et al. to create layers of titanium and gold in the thicknesses required by the claims. Also the thicknesses would depend on a specific application and one of ordinary skill in the art would be able to choose a specific value for an application as within the claims.

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4. Claims 1, 5 through 7, 9 through 11 and 15 through 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (U.S. 5,330,585) in view of Lindmayer (U.S. 4,124,455).

Chang discloses a gallium arsenide solar cell including an active semiconductor, a back electrical contact and a front electrical contact (figure 8).

Regarding claim 1, Chang discloses the front electrical contact is preferably a multilayer structure including layers of titanium, gold and silver (column 4, paragraph 6).

Regarding claims 5 and 7, as stated above the contact has a diffusion layer of gold and a joining layer of silver.

Regarding claim 9, the solar cell of Chang is a doped gallium arsenide layer.

Regarding claims 10 and 11, Chang discloses a method of making the solar cell by providing the semiconductor substrate, providing a back contact and then sequentially evaporating the front electrical contact (abstract and column 4, paragraph 6).

Regarding claim 16, as stated above, Chang discloses a gallium arsenide doped layer as the semiconductor substrate.

The difference between Chang and the claims is the requirement of a barrier layer between the gold diffusion layer and the silver joining layer.

Lindmayer teaches a method of making solar cells with multiple-metal contacts. Specifically, Lindmayer teaches placing a layer of platinum below the layer of silver (abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the platinum barrier layer of Lindmayer between the gold and silver layers within the device and method of Chang because the platinum barrier layer under the silver provides a better surface to deposit the silver onto (Lindmayer column 2, paragraph 1). The layer also further protects the semiconductor from the outside environment. Because Chang and Lindmayer are both concerned with solar cells with multilayer metal contacts, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

5. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita in view of Studer et al. as applied to claims 1, 2 and 5 through 17 above, and further in view of Salami et al. (U.S. 5,928,438).

The disclosure of Morita in view of Studer et al. is as stated above for claims 1, 2 and 5 through 17.

The difference between Morita in view of Studer et al. and claims 3 and 4 is the requirement of specific front electrode structures.

Salami teaches structure and fabrication of a solar cell. As shown in figure 1, the front electrical contact includes a current collector or busbar.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the current collector or busbar of Salami within the device of Morita in view of Studer et al. because the busbar is a well known structure within solar cells to collect the current from the front electrical contacts without shading a majority of the solar cell. Because Salami and Morita in view of Studer et al. are

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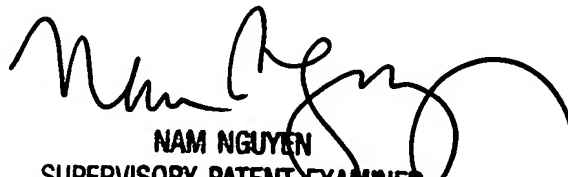
concerned with electrical contacts, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Fick whose telephone number is (571) 272-6393. The examiner can normally be reached on Monday thru Friday 7 AM to 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Anthony Fick *ADF*  
AU 1753  
September 29, 2006

  
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